Fall 2017: BMEN 4320 Syllabus

Course Information
Course: BMEN 4320: Intermediate Electrical Systems
Section: 001
Day/Time: Tuesday & Thursday: 4:00pm – 5:15pm
Location: ML1 1.106
Credit: 3.0 Semester Hours

Instructor Contact Information

Professor: Steven Foland, PhD
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Office Location: BSB 13.331

Teaching Assistant: Joshua Usoro
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Office hours:
TBA in class and by appointment.

Course Pre-requisites, Co-requisites, and/or Other Restrictions
Prerequisites: BMEN 3320 and BMEN 3120.
It is recommended that students take BMEN 3350 / BMEN 3150 prior to enrolling in this course.

Course Description
Principles of circuit and system analysis methods used in the design and analysis of biomedical instrumentation. Circuit solution methods, PCB layout, and embedded systems. Special emphasis is placed on circuits commonly employed in biomedical devices, mixed-signal hardware and software design, and wired and wireless communication systems commonly used in the biomedical device industry.

Course Learning Objectives & Student Outcomes

1. An ability to access and interpret electronics component datasheets, and a recognition of the importance of appropriate component selection during the engineering design process. – *(i) Recognition of the need for and an ability to engage in life-long learning.*
2. An ability to use professional PCB layout tools and software development environments to develop the hardware and software of an embedded device. – *(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.*
3. Design a device based around an embedded platform with wireless connectivity and motion sensing capabilities to meet a desired biomedical need. – *(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.*
4. An ability to apply troubleshooting techniques to identify and resolve electronics hardware and software issues. – *(e) Ability to identify, formulate and solve engineering problems.*
5. An ability to design an experiment to verify the functionality and efficacy of an engineered biomedical device. – *(b) Ability to design and conduct experiments, as well as to analyze and interpret data.*

Required Textbooks and Materials
All required reading materials will be made available in eLearning.

CC2650 Launchpad microcontroller platform will be required for completing a number of in-class assignments and the semester project. One will be provided to students during the semester; if lost or damaged, students will be responsible for replacing the device.

Suggested Course Materials
The following books may be useful resources for this class, but are not required:

Valvano, J. W., *Embedded Systems: Introduction to ARM Cortex-M Microcontrollers, 5th ed.* CreateSpace Independent Publishing Platform, 2012.

Valvano, J. W., *Embedded Systems: Real-Time Interfacing to ARM Cortex-M Microcontrollers, 2nd ed.* CreateSpace Independent Publishing Platform, 2011.

Valvano, J. W., *Embedded Systems: Real-Time Operating Systems for ARM Cortex-M Microcontrollers, 2nd ed.* CreateSpace Independent Publishing Platform, 2012.

Additional resources can be accessed at http://users.ece.utexas.edu/~valvano/

Tentative Academic Calendar

Week Of	Lecture Topic(s)
08/21	Introduction to MCU architecture.
08/28	Introduction to Code Composer Studio.
09/04	Intro to PCB layout in Altium.
09/11	Mixed-signal circuit design.
09/18	Wired communication protocols.
09/25	*Review and Exam I*
10/02	Wireless communication protocols.
10/09	Validation and human design factors.
10/16	Design considerations for human interfacing.
10/23	Haptic feedback and other high-load peripherals.
10/30	Wireless charging and power management.
11/06	*Review and Exam II*
11/13	Debugging hardware and software.
11/20	Verification and experimental design.
11/27	Advanced embedded system design concepts.
12/04	*Review*

Grading Policy
Exam I: 15%
Exam II: 15%
Final Exam: 20%
Semester Project: 25%
Homework Assignments: 20%
Class Participation: 5%

Letter grade will be assigned as:

Grade	Points	Grade	Points	Grade	Points	Grade	Points
A+	97-100	B+	87-89.9	C+	77-79.9	D+	67-69.9
A	93-96.9	B	83-86.9	C	73-76.9	D	63-66.9
A-	90-92.9	B-	80-82.9	C-	70-72.9	D-	60-62.9
						F	<60

Course & Instructor Policies

- Class attendance is mandatory. Advance notice for any non-emergency absence to the instructor is expected. Student will lose credit for the day of non-participation in the class activity.
- Students must complete all in-class activities and projects.
- Late work will be assigned a 25% penalty per 24 hours late.
- Grade disputes must be brought to the instructor's attention within one week of an assigned grade. In case of such a dispute, please be prepared to provide justification for your request.
- Each student is expected to participate in class discussion and activities.
- No alternative testing schedule or make up exams will be administered without prior authorization.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.